# DC-QNet

Washington Metropolitan Quantum Network Research Consortium

*Developing a Quantum Network Infrastructure*

# Agenda

- Description
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# DC-QNet

## A consortium of six metropolitan Washington D.C. USG research laboratories

Objective: Create, develop and demonstrate a regional quantum network testbed

- An open, non-proprietary, environment for test and evaluation of concepts, components, network protocols, architectures and metrology developed both within and eventually beyond the member agencies.
- Enable joint cross-cutting agency synergism in sensor development, secure communications, distributed computing and yet to be discovered use case applications

DEVCOM ARMY RESEARCH LABORATORY

U.S. NAVAL RESEARCH LABORATORY

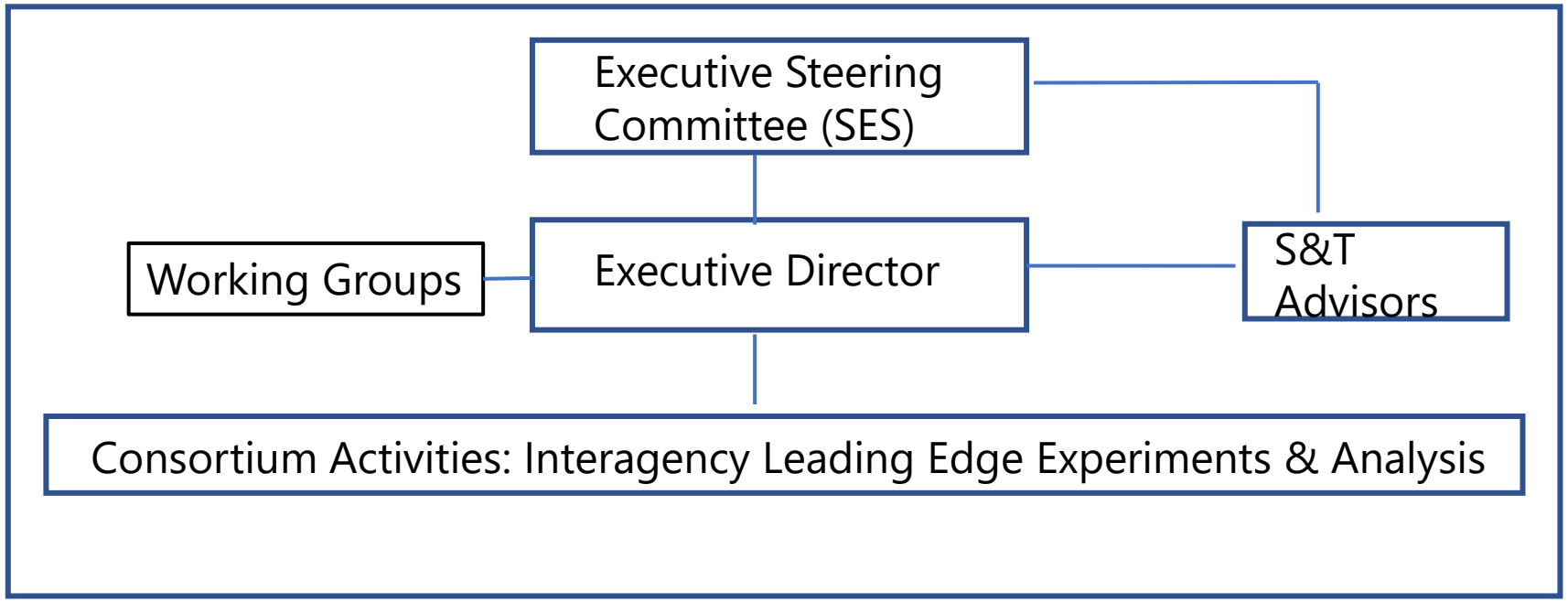
NIST National Institute of Standards and Technology U.S. Department of Commerce

UNITED STATES NAVAL OBSERVATORY

LABORATORY FOR TELECOMMUNICATION SCIENCES

NASA

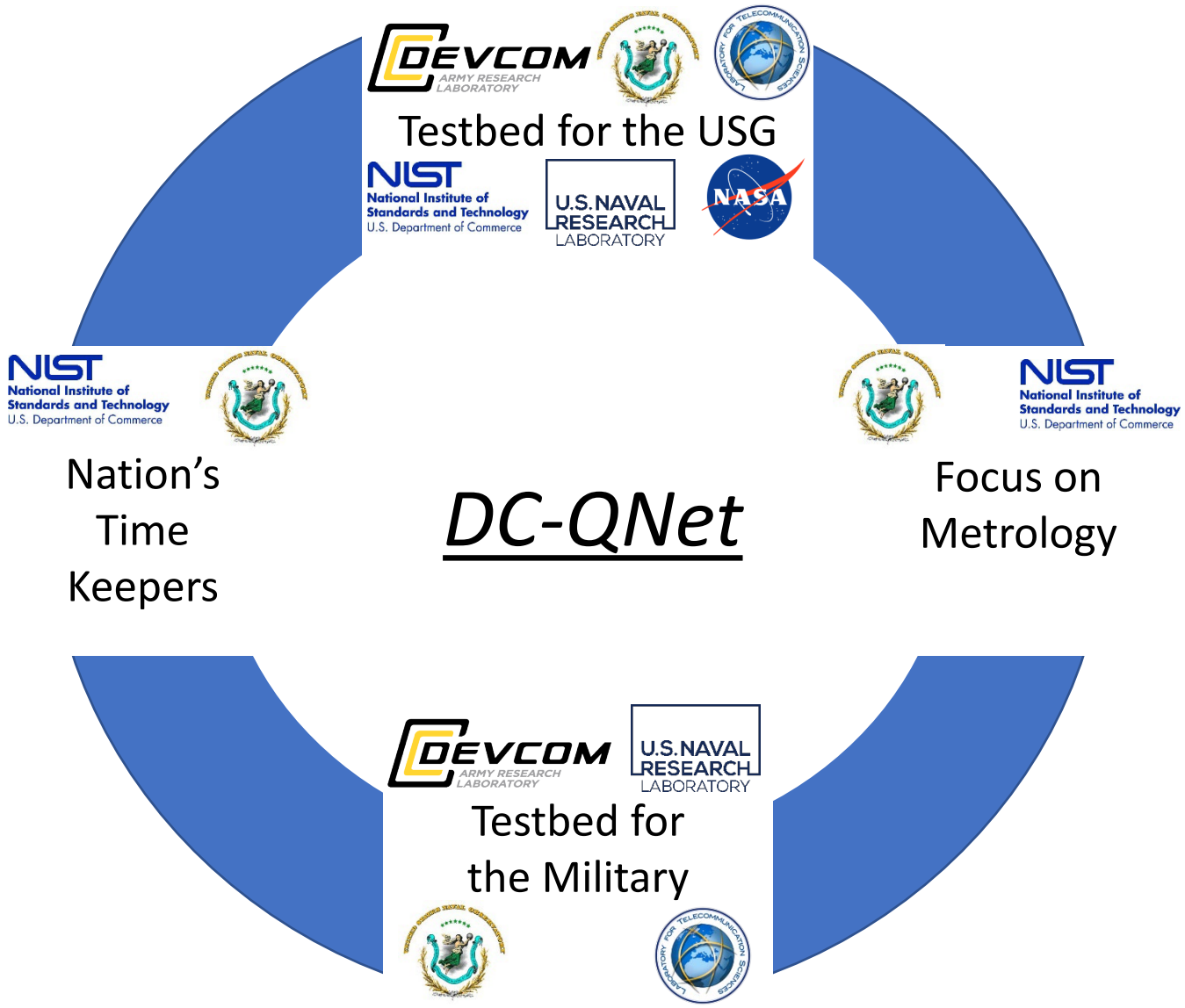
# Organizational Structure




Codified by an Interagency MOU of 18 May 2022

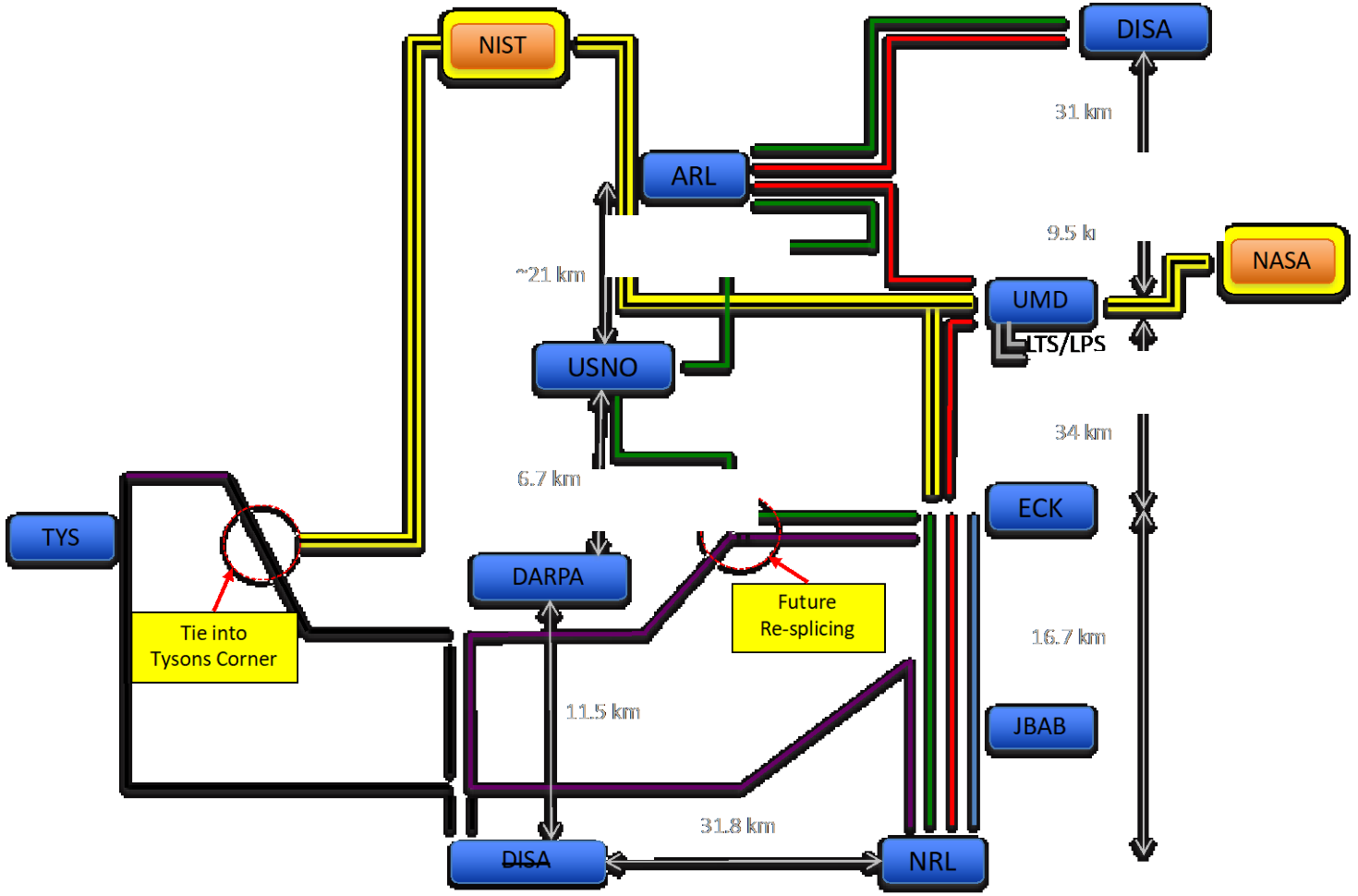
# Key Attributes

- By having only federal employees in certain technical areas, we can pursue pre-decisional activities and CUI
- Being in DC makes it easy for policy makers/funding organizations to witness the technology and use case applications
- Having the best time-keeping expertise may be a prerequisite for quality quantum networking
- Providing a platform for the DoD to test its special quantum network requirements
- A focus on metrology in support of QN will be crucial as precursor to open architectures and standards



# Washington Metro Dark Fiber Assets

*From Glass To Applications…*



# Activities

**Enabling components for quantum networks**

- Single Photon Sources and Detectors
- Quantum memory and repeater components
- Entanglement generation & storage
- Quantum frequency conversion

**Infrastructure for quantum networks**

- Fiber loss and stability evaluation
- Fiber stabilization techniques
- Transduction
- Synchronization
- Emulation, M&S
- Free Space Links
- Architecture Implementations

**Early-stage quantum network experimentation**

- Classical control plane + quantum channel

| Name | Activities | Status |
|---|---|---|
| Experiments | Define experiments for development for the QN | On going |
| Fiber Network Eval and Stabilization | Existing Fiber and physical infrastructure (Insertion loss and other non-idealities in fiber connections) | On going |
| Interface Specifications | Ensuring compatible frequencies, time bin ranges, rates, powers, amplitudes, etc. | On going |

# Technical Objectives

**Near-Term (2-4 years)**

- Fiber characterization and basic networking experiments
- Quantum interference demonstration
- Entanglement demonstration between nodes

**Longer Term (5-10 years)**

- Controlled quantum network
- Multiple users with full nodes
- DC-QNet regional QN connected to other regional QNs

# Thank You

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**Learn more:** https://esc.gsfc.nasa.gov/partnerships/DC-QNet